



Service Manual

**RapidVac™**

Smoke Evacuator

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## Forward

This manual and the equipment it describes are for use only by qualified medical professionals trained in the particular technique and surgical procedure to be performed. It is intended as a guide for servicing the RapidVac™ Smoke Evacuator only. Additional users information is available in the ***RapidVac™ Smoke Evacuator User's Guide***.

### Caution

Federal (USA) law restricts this device to sale by or on the order of a physician.

### Equipment covered in this manual

RapidVac™ Smoke Evacuator - 110 V and 220 V

**Part Number** 1009803

**Effective Date** May 2008

### Trademark acknowledgements

RapidVac™, is a trademark of Valleylab. All trade names referenced are the trademarks, registered trademarks, or products of their respective manufacturers.

### Manufactured for

Valleylab, a division of Tyco Healthcare Group LP  
Boulder, Colorado 80301-3299 USA

### European representative

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Device is compliant with the European Communities Council Directive 93/42/EEC, Medical Device Directive.

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|                                           |                                        |
|-------------------------------------------|----------------------------------------|
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| <b>Electrosurgical Generators</b>         | One year from date of shipment         |
| <b>RFG-3C™ Plus Lesion Generator</b>      | One year from date of shipment         |
| <b>LigaSure™ Vessel Sealing System</b>    | One year from date of shipment         |
| <b>LigaSure™ Reusable Instruments</b>     | One year from date of shipment         |
| <b>Mounting Fixtures (all models)</b>     | One year from date of shipment         |
| <b>Footswitches (all models)</b>          | One year from date of shipment         |
| <b>Force Argon™ Units</b>                 | One year from date of shipment         |
| <b>RapidVac™ Smoke Evacuator</b>          | One year from date of shipment         |
| <b>LigaSure™ Sterile Single Use Items</b> | Sterility only as stated on packaging  |
| <b>Sterile Single Use Items</b>           | Sterility only as stated on packaging  |
| <b>Patient Return Electrodes</b>          | Shelf life only as stated on packaging |

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Valleylab, its dealers, and representatives reserve the right to make changes in equipment built and/or sold by them at any time without incurring any obligation to make the same or similar changes on equipment previously built and/or sold by them.

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## Conventions Used in this Guide

### **Warning**

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

### **Caution**

Indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.

### **Notice**

Indicates a hazard which may result in product damage.

### **Important**

Indicates *an operating tip or maintenance suggestion*.



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## Introducing the RapidVac Smoke Evacuator

This section provides an overview of the features and functions of the ForceTriad energy platform.

### Caution

Read all warnings, cautions, and instructions provided with this system before use.

Read the instructions, warnings, and cautions provided with smoke evacuator accessories before use. Specific instructions are not included in this manual.

## Parts Shipped with the Smoke Evacuator

When unpacking the smoke evacuator, verify that the following parts are included:

- Power cord
- User's guide and service manual
- Quick reference card

Upon initial receipt, inspect the smoke evacuator for dents, cracks, or damage that may have occurred during shipment. If damage is present, notify the freight carrier for assessment.

Additional items available from Valleylab:

- Replacement RapidVac Filters
- RapidVac Footswitch
- RapidVac Remote Switch Activator
- Generator Interlink Cable
- Laparoscopic Smoke Evacuator Tubing Kit
- Hoses, tubing, adapters, wands and other accessories

## About the RapidVac Smoke Evacuator

The RapidVac Smoke Evacuator captures particulates and adsorbs gases from surgical smoke. The smoke evacuator is specifically designed to improve visibility and reduce potential health hazards associated with surgical smoke. It can be used in both open and laparoscopic procedures.

The RapidVac Smoke Evacuator is designed with a high suction, high flow rate centrifugal action pump. The ultra-quiet motor is used to draw the smoke from the surgical site through the vacuum tubing and into the system where it is processed by a series of filters. A single disposable filter is used to simplify the installation and removal during filter changes. The filter is completely enclosed to protect the healthcare personnel from potential contamination during filter changes.

One SEA3700 Filter contains four filtration stages to capture the smoke plume:

- **Stage 1** - A prefilter that traps and removes gross particulate and incidental fluid
- **Stage 2** - An ULPA grade (Ultra Low Penetration Air) patented filter captures particulates and micro-organisms down to 0.1  $\mu\text{m}$  at 99.9995% efficiency.
- **Stage 3** - The highest grade virgin activated carbon, designed specifically for Valleylab for the removal and adsorption of odors and toxic gases produced by burning tissue. These harmful gases may constitute a health hazard to healthcare professionals who are subjected to prolonged exposure. The activated carbon used in the smoke evacuation system preferentially removes toxic organic gases (rather than water vapor) and provides optimal odor removal.
- **Stage 4** - An expanded foam used to trap activated carbon fines from migrating out of the filter.

## Features

RapidVac Smoke Evacuator features include:

- Filter-life monitoring for its four-stage, 25-five hour filter
- Standby, RapidVac+, footswitch, or continuous operation modes
- Quiet operation
- Adjustable flow
- Compatibility with all Valleylab electrosurgery pencils and generators

## RapidVac+ System

The RapidVac Smoke Evacuator incorporates The RapidVac+ mode which controls the flow of the smoke evacuator when using a Valleylab electrosurgical pencil. When the electrosurgical pencil is activated, the smoke evacuator operates in the preselected flow setting. When the pencil is deactivated, the air flow reduces to a low-flow purge setting.

Two Valleylab accessories link the electrosurgical generator and smoke evacuator to enable the RapidVac+ mode:

- RapidVac Remote Switch Activator
- Generator Interlink Cable

## Operating Modes

Four operating modes are available: standby, footswitch, RapidVac+, and continuous.

- *Standby* mode powers up the unit without activating the motor or vacuum flow.
- *Footswitch* mode is used to turn the smoke evacuator on or off with the optional footswitch pedal.
- *RapidVac+* mode is used to control the vacuum flow simultaneously with activation of an electrosurgical pencil. This mode is controlled with the optional generator interlink or electrosurgery sensor.
- *Continuous* mode is used to operate the smoke evacuator using continuous air flow.

## Service Personnel Safety

### General

#### Warning

During initial set up, inspect the smoke evacuator for any damage that may have been caused during shipping. If damaged, do not use or attempt to repair. Call Valleylab for service assistance.

The RapidVac Smoke Evacuator filter is a disposable component that captures potentially hazardous particles. Handle used filters as you would any biohazardous material. Dispose of used filters according to your local codes and regulations, and follow your institutions procedures for disposal.

The smoke evacuation filter has a life of approximately 25 hours of use and should not be used beyond the specified time. If the Replace Filter indicator illuminates during operation, the smoke evacuator will continue to run until it is turned off. Turning power off to the smoke evacuator will require replacement of the filter before subsequent use.

Failure to change the filter accordingly may result in decreased efficiency in smoke evacuation and contamination of the motor, vacuum pump, and sound absorbing media within the smoke evacuator.

The RapidVac Smoke Evacuator filter is disposable. Dispose of used filters according to your local codes and regulations, and follow your institutions procedures for disposal

Do not operate this device in potentially explosive environments, such as in the presence of flammable anesthetics.

Refer routine servicing to qualified biomedical technical personnel.

Use only with the power cord provided and always plug into a grounded outlet.

Do not use two- or three-prong adapters with the smoke evacuator power cords.

The power-cord assembly should be checked periodically for damaged insulation or connectors. Do not use damaged cords.

Use of extension cords may result in fire hazards.

This device is not intended for the evacuation of fluid. If fluid is expected to be aspirated to the smoke evacuation filter, a fluid collection device must be installed with the vacuum hose assembly. Failure to install a fluid collection device could cause filter blockage and electrical damage. Contact Valleylab Service for additional information.

Do not connect a wet power cord to the wall receptacle.

Connect the smoke evacuator power cord to a properly grounded receptacle. Plug the power cord directly into the power receptacle without any adapter plugs. Use of power plug adapters may result in electric shock.

**Caution**

Do not stack equipment on top of the smoke evacuator or place the smoke evacuator on top of electrical equipment. These configurations are unstable and/or do not allow for adequate cooling.

Use only Valleylab SEA3700 Filters in the RapidVac Smoke Evacuator. Filters from other manufacturers may cause damage to the system, thereby voiding the warranty.

Provide as much distance as possible between the smoke evacuator and other electronic equipment (such as monitors). An activated smoke evacuator may cause interference with them.

Read all warnings, cautions, and instructions provided with the RapidVac Smoke Evacuator before using.

To maximize patient safety, the tubing or wand should not come in direct contact with tissue. Otherwise, patient injury may result.

Do not block either the tubing or the filter. If either becomes occluded or significantly restricted, the motor/blower may overheat and cause the unit to shut down.

Care must be exercised in the installation of hoses, adapters and suction canisters. Failure to follow the procedures outlined in this manual may result in overheating of the motor and may void the unit warranty.

**Notice**

Using any unapproved filter or accessory with the smoke evacuator may cause damage and will void the warranty.

The RapidVac Smoke Evacuator functions properly only when the ULPA filter is installed properly. If the filter is installed incorrectly, the amber Replace Filter indicator flashes and the Service indicator is illuminated.

Fluids may damage the filters. When evacuating smoke and incidental fluids, always use the appropriate tubing,

Connect the power cord to a wall receptacle having the correct voltage. Otherwise, product damage will result.

Power line voltage below 100 Vac (110 V SEA3690) and 200 Vac (220 V SEA3695) will significantly reduce airflow.

Connecting multiple lengths of tubing together may cause the smoke evacuator to overheat.

The RapidVac Smoke Evacuator has been specially designed to fit on Valleylab mounting carts only. Do not install the smoke evacuator on a cart other than a Valleylab cart. Installing the smoke evacuator inside a cart with improper ventilation may result in overheating or may adversely affect the stability of the cart.

Periodically check the cart brackets that hold the smoke evacuator in place to ensure that the screws are securely fastened.

Stacking the smoke evacuator on top of a generator may cause an unstable condition and/or cause the smoke evacuator to overheat.

## Maintenance

### Warning

Always turn off and unplug the smoke evacuator before cleaning.

The ULPA filter captures potentially hazardous particles. Handle used filters as you would any biohazardous material. Dispose of filters with other operative waste materials according to the procedures for your institution.

### Caution

Do not reuse or resterilize smoke evacuator accessories labeled “disposable,” “single use only,” or “sterile.”

### Notice

Do not rub, touch, or clean the smoke evacuator with alcohol or caustic, corrosive, or abrasive cleaning or disinfectant compounds, solvents, or other materials that could scratch the control panel or damage the smoke evacuator.

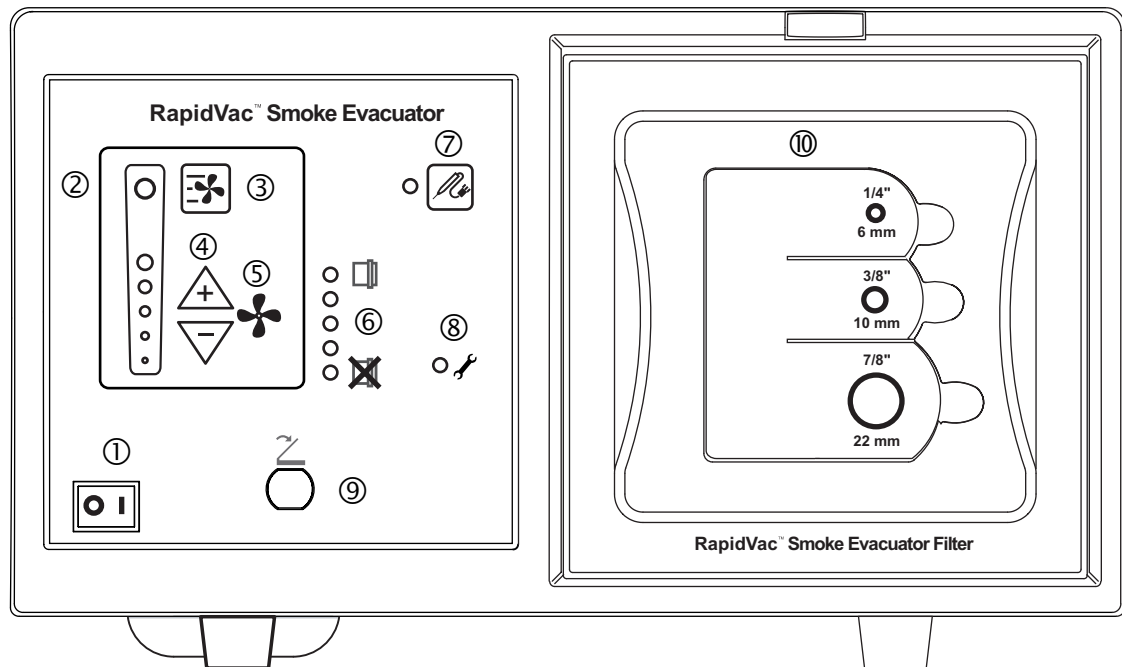
Do not autoclave, pressure sterilize, or gas sterilize the smoke evacuator.

Keep the smoke evacuator away from liquids. Liquids that enter the smoke evacuator will damage internal components.

# Controls, Indicators, and Receptacles

This section describes the front and rear panels of the smoke evacuator, including all controls, indicators, receptacles, and ports.

## Front Panel



- ① Power On/Off switch
- ② Air-flow indicators (LED)
- ③ Turbo button
- ④ Air-flow controls
- ⑤ Power on indicator (LED centered in fan symbol)
- ⑥ Filter life indicators (LED)
- ⑦ RapidVac+ button
- ⑧ Service required indicator
- ⑨ Footswitch jack
- ⑩ Air filter with tubing connectors

**Caution**

Connect accessories to the proper receptacle type. Otherwise, the smoke evacuator may not function properly.

Accessory equipment connected to interfaces must be certified according to IEC 60601-1-1. All configurations shall comply with the system standard IEC 60601-1-1. The user is responsible for verifying that accessory equipment connections comply with the system requirements of IEC 60601-1-1. If in doubt, contact Valleylab.

The electronic system controls on the RapidVac Smoke Evacuator are easy to understand and simple to use. The control panel contains the suction on/off switch, suction power adjustment, filter life indicator, and service indicator light.

**Notice**

Read all instructions before installing accessories or operating this equipment. Failure to do so may result in damage to the unit and/or personal injury.

**Power On/Off Switch**

The power switch that controls power to the RapidVac Smoke Evacuator is located in the lower-left corner of the front panel. To power up the smoke evacuator, place the power switch in the ON position ( I ). The smoke evacuator starts in standby (system power is on with no suction). When the smoke evacuator is on in standby, the LED in the center of the fan symbol on the front panel will blink continually until a fan speed is selected.

Turn the system power off by placing the power switch in the OFF position ( O ).

**Air Flow Controls**

The level of suction is controlled by the air-flow controls. up-arrow () and down-arrow () buttons. To start the fan from standby mode, press the up-arrow button. It starts in the lowest suction setting indicated by a single illuminated air-flow indicator.

The suction control should be set at the lowest practical setting to completely remove the surgical smoke from the operative site. Pressing either the up- or down-arrow buttons changes the current suction level by 20%. The selected level of suction is displayed by the air-flow indicator LEDs.

**Turbo Button**

When increased smoke removal is necessary, the Turbo button may be pressed at anytime to increase suction. Turbo mode effectively increases the airflow to 100% suction flow to quickly remove the smoke plume from the surgical site.

## **Filter Life Indicator**

The filter life indicator provides a visual indication of the status of the life of the filter in use. Each illuminated LED represents five hours of remaining time on the 25-hour filter. The RapidVac Smoke Evacuator tracks the time each filter has been used allowing for an accurate display of remaining use for new or previously used filters.

### ***Reading the Filter Life Indicator***

Install an unused RapidVac filter into the system. When the smoke evacuator is on, all five of the filter life indicator LEDs illuminate indicating the new filter has 100% filter life. The indicator will regress through subsequent LEDs until the final LED is illuminated indicating less than 5 hours of filter life remaining. At one hour remaining, the LED changes to amber. When the time remaining reaches 30 minutes, the amber LED flashes slowly.

## **RapidVac+ Button**

When the smoke evacuator is connected to a generator using the Generator Interlink Cable, pressing the RapidVac+ button synchronizes the smoke evacuator with the use of an electrosurgical pencil. When a pencil is activated, the smoke evacuator activates to a preselected air flow level.

## **Footswitch Jack**

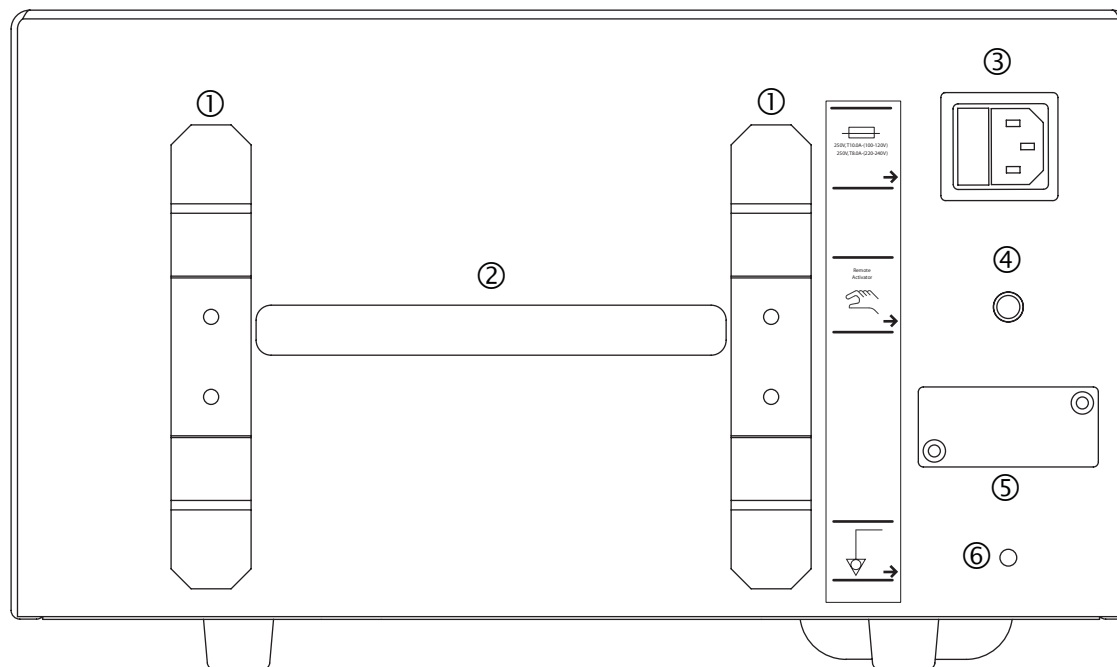
A RapidVac Footswitch (SEA3745) is available for use with the RapidVac Smoke Evacuator.

A footswitch may be added to any system by simply plugging it into the footswitch jack on the front panel. The unit may be turned on or off by depressing the footswitch pedal once for each operation. For footswitching operation, the smoke evacuator should be on and the suction level to be activated from the footswitch should be selected on the control panel.

## **Service Required Indicator**

The motor powering the RapidVac Smoke Evacuator has two motor brushes that require regular maintenance every 500 hours. When the smoke evacuator has been in use for 500 hours, the Service Required Indicator illuminates. Replace the motor brushes as directed in “Motor Brush Replacement” on page 4-7. After brush replacement, reset the system by simultaneously depressing the up- and down-arrow air flow controls until the Service Required Indicator turns off.

## Rear Panel



- ① Cord brackets
- ② Carrying handle
- ③ Power-cord receptacle/fuse tray
- ④ Remote Activator jack
- ⑤ EPROM jack
- ⑥ Equipotential grounding lug

Controls, Indicators, and  
Receptacles

### Power Cord Receptacle/Fuse Tray

The cord receptacle provides power to the smoke evacuator using a removable cord appropriate for regional power supplies. Cord can be wound on the cord brackets to store with the smoke evacuator.

Two 10 AMP fuses in the 110V model (8 AMP for 220V) are located in a removable tray adjacent to the cord receptacle. Fuses electrically protect the system from damage and the operator from injury. If the system is overheated or if there is an electrical surge in the electrical system, fuses will open and the system will not operate. To re-start the system, unplug the power cord and replace the fuses.

### Remote Activator Jack

A Generator Interlink Cable (SEA3730) and Remote Switch Activator (SEA3740) are available for the automatic remote activation of the RapidVac Smoke Evacuator.

The Generator Interlink Cable is compatible with the Valleylab Force FX™, ForceEZ™, and ForceTriad™ generators. It attaches to a generator's RF activation port and to the smoke evacuator's Remote Activator jack. When the generator is activated, the smoke evacuator automatically initiates the pre-set suction.

The Remote Switch Activator is a programmable switch that plugs into the smoke evacuator jack and is attached to an electrosurgical generator. The remote switch is programmed to recognize the audible tones used by the generator. When the tone for cut or coag sounds, the remote switch automatically initiates the pre-set suction.

### **EPROM Jack (Covered)**

The EPROM jack located under the secured cover is to be used only by qualified Valleylab service technicians to update the smoke evacuator's software.

### **Equipotential Grounding Lug**

The equipotential grounding lug provides an alternate rout for electrical energy back to ground when attached to an earth-ground cable.

# Technical Specifications

All specifications are nominal and subject to change without notice.

## Performance Characteristics

### Dimensions and Weight

|               |                                             |
|---------------|---------------------------------------------|
| <b>Width</b>  | 36 cm (14 in.)                              |
| <b>Depth</b>  | 48 cm (18.75 in.) with cord wrap and handle |
| <b>Height</b> | 20.5 cm (8 in.)                             |
| <b>Weight</b> | 9.9 kg (20.5 lbs.) without filter           |

### Filter

|                    |                                                                                                        |
|--------------------|--------------------------------------------------------------------------------------------------------|
| <b>ULPA filter</b> | 0.12 micron particulate size at 99.9995% efficiency;<br>activated charcoal for gas and odor adsorption |
|--------------------|--------------------------------------------------------------------------------------------------------|

### Airflow

0 - 1.25 m<sup>3</sup>/min. (0 - 44 cfm) with 2.2 cm x 3 m (7/8 in. x 10 ft.) tubing with sponge guard.

Airflow measured at sea level.

### Safety

| <b>110 Volt</b>                                               | <b>220 Volt</b>                                               |
|---------------------------------------------------------------|---------------------------------------------------------------|
| Fuse: 10 AMPS                                                 | Fuse: 8 AMPS                                                  |
| Power cord:<br>3-prong hospital grade plug                    | Power cord:<br>3-prong locally approved connector             |
| Leakage current: (50/60 Hz)                                   | Leakage current: (50/60 Hz)                                   |
| Normal polarity, smoke evacuator in<br>standby mode < 300 µA  | Normal polarity, smoke evacuator in<br>standby mode < 300 µA  |
| Reverse polarity, smoke evacuator in<br>standby mode < 300 µA | Reverse polarity, smoke evacuator in<br>standby mode < 300 µA |

## Power

This unit is equipped from the factory with either a 110 VAC hospital grade NEMA 5-15 power cord or a 220 VAC CEE7/7 power cord. Should the AC power cord need replacing to match another plug configuration, the replacement plug/cable/receptacle configuration must meet or exceed the following specifications.

### 100-120 VAC

Cable - SJT16/3, IEC color code, maximum length 15 ft. (5m)

Plug - minimum 10A 125 VAC

Unit receptacle - IEC female, minimum 10A 125 VAC

### 220-240 VAC

Cable - H05VVH3G1.0 VDE, maximum length 15 ft. (5m)

Plug - minimum 6A 250 VAC

Unit receptacle - IEC female, minimum 6A 250 VAC

## Operating Parameters

|                                  |                              |
|----------------------------------|------------------------------|
| <b>Ambient temperature range</b> | 10°C to 40°C (50°F to 104°F) |
| <b>Relative humidity</b>         | 30% to 75%, noncondensing    |

## Transport and Storage

|                                  |                                |
|----------------------------------|--------------------------------|
| <b>Ambient temperature range</b> | -34°C to 65°C (-29°F to 149°F) |
| <b>Relative humidity</b>         | 25% to 85%, noncondensing      |

# EMC for the RapidVac Smoke Evacuator

## Electromagnetic Compatibility (IEC 60601-1-2)

The RapidVac Smoke Evacuator complies with the appropriate IEC 60601-1-2 specifications regarding electromagnetic compatibility.

The RapidVac Smoke Evacuator meets the following requirements:

- ESD Immunity (IEC 60601-1-2 sub-clause 36.202 and IEC 61000-4-2)
- Radiated Immunity (IEC 60601-1-2 sub-clause 36.202.2 and IEC 61000-4-3)
- Electrical Fast Transient/Burst (IEC 60601-1-2 sub-clause 36.202.3.1 and IEC 61000-4-4)
- Surge Immunity (IEC 60601-1-2 sub-clause 36.202.3.2 and IEC 61000-4-5)
- Emissions (IEC 60601-1-2 sub-clause 36.201.1)

- Harmonic distortion (IEC 60601-1-2 sub-clause 36.201.3.1 and IEC 61000-3-2)
- Conducted disturbances (IEC 60601-1-2 sub clause 36.202.6 and IEC 61000-4-6)
- Power frequency magnetic fields (IEC 60601-1-2 sub-clause 36.202.8.1 and IEC 61000-4-8)
- Voltage dips, short interruptions and variations (IEC 60601-1-2 sub-clause 36.202.7 and IEC 61000-4-11)

## Description of Symbols

### Front Panel



Power Off/On



Turbo Button. Press to jump to maximum suction at 100% motor speed.



Air Flow Control. Press up-arrow button (+) to increase flow 10%, or down-arrow button (-) to decrease flow by 10%.



Power On Indicator. LED at the center of the fan illuminates when power to the smoke evacuator is on. A flashing LED indicates the smoke evacuator is in standby mode.



New filter. Its position next to the top filter life indicator, it signifies the filter has 100% of its filter life remaining.



Replace filter. Its position next to the bottom filter life indicator, it signifies the filter has no filter life remaining and needs to be replaced.



RapidVac+ Button: Remote Switch Activator cord is attached to a generator. Electrosurgery sensor will activate the smoke evacuator.



Footswitch Jack: Attach pneumatic footswitch.



Service Required Indicator: After 500 hours of use, the LED illuminates indicating motor brushes require changing.

## Rear Panel



Fuses



Remote Activator Connector



Manufacturer



Authorized European Representative



Do not discard equipment in trash



Latex-Free product.



Date of product manufacture, year - month.

## Standards and IEC Classifications



Type CF applied part. Complies with IEC 60601-1

IPX1

Protect against dripping water



Alternating current

**DANGER**

Explosion risk if used with flammable anesthetics



To reduce the risk of electric shock, do not remove the cover. Refer servicing to qualified service personnel.



**ATTENTION**

Consult accompanying documents



Classified with respect to electrical shock, fire, and mechanical hazards only in accordance with UL60601-1 and CAN/CSA C22.2 No. 601.1



Product complies with European Product Directives

## Setup, Tests, and Maintenance

After unpacking the RapidVac Smoke Evacuator, set it up and verify that it functions correctly by performing the tests described in this section.

Maintenance of the smoke evacuator requires replacing motor brushes every 500 hours of operation. The replacement procedure is described in this section.

## Cleaning the Smoke Evacuator

Clean the smoke evacuator before servicing or testing to minimize the risk of coming in contact with contaminants present from previous use.

### Warning

Always turn off and unplug the smoke evacuator before cleaning.

The tubing and filter capture potentially hazardous particles. When removed, handle as you would any biohazardous material. Dispose of these items with other operative waste materials according to the procedures for your institution.

Wear appropriate protective gear when cleaning the filter ports and covering flap to avoid coming in contact with incidental contaminants on these surfaces.

### Notice

Do not rub, touch, or clean the smoke evacuator with alcohol or caustic, corrosive or abrasive cleaning or disinfectant compounds, solvents, or other materials that could scratch the control panel or damage the smoke evacuator.

Do not autoclave, pressure sterilize, or gas sterilize the smoke evacuator.

Keep the smoke evacuator away from liquids. Liquids that enter the smoke evacuator will damage internal components. Do not spray liquid cleaner into the filter ports.

1. Ensure that the power switch on the front panel is off (O).
2. Disconnect the power cord from the wall receptacle.
3. Thoroughly wipe all external surfaces with a mild detergent or disinfectant.
4. Thoroughly clean both sides of the flap covering the filter ports. Do not spray liquid cleaner into the filter ports.
5. Clean the surface around the filter ports. Do not spray liquid cleaner into the filter ports. Follow procedures approved by your institution, or use a validated infection-control procedure.

### Warning

Wear protective gloves when cleaning around filter ports. Do not place fingers into ports or touch the internal surface of the ULPA filter. Contaminants may be present.

6. Ensure the smoke evacuator is completely dry before use.

# Testing the Smoke Evacuator

This section provides instructions for setting up and testing the following smoke evacuator components:

- RapidVac ULPA filter
- Airflow controls
- Valleylab footswitch (as applicable)
- RapidVac Remote Switch Activator (as applicable)
- Generator Interlink Cable (as applicable)

## Checking the Remaining Filter Life

RapidVac Smoke Evacuator filters have a use duration of 25 hours. As a filter is used, information about the amount of time the individual filter has been used is stored in the filter’s RFID tag. Whenever a new or previously used filter is inserted, the smoke evacuator reads the stored information from the tag. The remaining filter life is visually displayed by the corresponding number of filter life indicators on the smoke evacuator front panel.

1. Turn on the smoke evacuator and insert a filter.
2. Check the filter life indicators on the front t panel to verify the filter has ample remaining time to complete a procedure.

| Illuminated Filter Life Indicators | Remaining Use        |
|------------------------------------|----------------------|
| All                                | 25 to 20 hours       |
| 4                                  | 20 to 15 hours       |
| 3                                  | 15 to 10 hours       |
| 2                                  | 10 to 5 hours        |
| 1 (green)                          | 5 hours to 1 hour    |
| 1 (amber)                          | less than 1 hour     |
| 1 (flashing amber)                 | less than 30 minutes |

### Important

Replace the filter when indicated. Failure to replace the filter may reduce airflow and compromise the efficiency of the filter.

## Changing the Filter

### Warning

The ULPA filter captures potentially hazardous particles. Handle used filters as you would any biohazardous material. Dispose of filters with other operative waste materials according to the procedures for your institution.

1. Remove the filter by depressing the locking tab on the top edge of the filter while pulling the filter straight out of the opening.
2. Dispose of this filter with other operative waste materials according to the procedures for your institution.
3. Install a new filter in the smoke evacuator as described earlier in this section.

## Testing the Airflow Controls

### Warning

The smoke evacuator produces a strong vacuum. Properly adjust the airflow and the position of the inlet end of the wand or tubing to prevent patient injury and to prevent suction of surgical materials and surgical specimens.

You can start, stop, and change the vacuum airflow rate when the smoke evacuator is on. Illuminated LEDs display the airflow setting. Each pressing of the up-arrow () or down-arrow () increases or decreases suction by 20%.

There are five suction flow indicator LEDs that light in succession. Turbo Mode illuminates the sixth LED next to the Turbo button.

| Suction Flow              | Illuminated Suction Flow Indicators               |
|---------------------------|---------------------------------------------------|
| No suction (Standby Mode) | None (LED at the center of the fan symbol blinks) |
| 20% motor speed           | 1                                                 |
| 40% motor speed           | 2                                                 |
| 60% motor speed           | 3                                                 |
| 80% motor speed           | 4                                                 |
| 100% motor speed          | 5                                                 |
| Turbo Mode (100%)         | 6                                                 |

1. Verify that the filter is installed properly.
2. Ensure that the power cord is plugged into a hospital grade power receptacle.

3. Turn on the smoke evacuator by pressing the power on switch ( | ) on the lower left of the front panel. The smoke evacuator powers up with the fan motor off (standby mode). The LED in the center of the fan symbol blinks indicating power is on.
4. Press the up-arrow (  ) button once to start suction at the lowest air-flow setting.
5. Press the up-arrow (  ) button and pause briefly to progress to the next level of suction. Verify that the level of suction noticeably increases with each progression.
6. When all suction flow LEDs are lit steadily (100% motor speed), press the down-arrow (  ) button repeatedly to regress through the settings to the lowest setting.

### Installing and Testing the Footswitch (*optional*)

Only use the Valleylab Footswitch with the smoke evacuator. Other footswitches are not compatible.

1. Turn on the smoke evacuator.
2. Connect the footswitch cord to the footswitch jack on the front panel.
3. Turn on the airflow to any setting.
4. Press the footswitch once to turn off the airflow.
5. Press the footswitch again to activate the airflow.

### Installing and Testing the Remote Switch Activator (*optional*)

Use the Valleylab Remote Switch Activator with any of Valleylab's electrosurgical pencils and generators.

1. Select a location on the generator near the speaker where the Remote Switch Activator is to be mounted.
2. Clean the surface of the selected area with alcohol. Allow the alcohol to evaporate.
3. Remove the backing from the gasket on the RSA.
4. Affix the RSA to the generator.
5. Plug the RSA connector into the Remote Activator jack located on the back panel of the smoke evacuator.
6. Turn on the smoke evacuator and press the up-arrow (  ) button twice to illuminate the first two air flow indicators (40% motor speed).
7. Set up the surgical pencil and generator as instructed in their user documentation. If the generator's audible-tone volume can be adjusted, set it at 50%.
8. Initiate programming the Remote Switch Activator by pressing the Program/Reset button continually for 10 seconds.
9. Set the generator to cut mode.

10. Activate the generator in cut mode until the smoke evacuator motor starts. Depending on the generator, this may take up to 40 seconds.
11. When the smoke evacuator motor starts, deactivate the generator in cut mode.

**Important**

Do not activate the generator in cut mode again until the Remote Switch Activator has been programmed in coag mode.

12. Set the generator to coag mode.
13. Activate the generator in coag mode until the smoke evacuator motor starts. Depending on the generator, this may take up to 40 seconds.
14. When the smoke evacuator motor starts, deactivate the generator in coag mode.

**Important**

If the generator has only one tone, program this same tone into the Remote Switch Activator memory.

If both the cut and coag tones are not activating the smoke evacuator reprogram the Remote Switch Activator. Disconnect the Remote Switch Activator from the smoke evacuator, then re-connect. Repeat the programming instructions beginning with step 8.

The Remote Switch Activator is now programmed. Powering on and off the RapidVac Smoke Evacuator is now controlled by the generator and Remote Switch Activator.

**Important**

If the attached smoke evacuator is to be disconnected from the generator, unplug the Remote Switch Activator from the smoke evacuator. The Remote Switch Activator should remain affixed to the generator to which it was programmed. The RapidVac Smoke Evacuator cannot be operated manually or with a footswitch while the Remote Switch Activator is plugged into the smoke evacuator.

If the Remote Switch Activator is moved to another generator, it must be reprogrammed using the steps in this section.

### Installing and Testing the Generator Interlink Cable *(optional)*

The Generator Interlink Cable attaches to a RapidVac Smoke Evacuator and a compatible Valleylab generator to synchronize smoke evacuation with the activation of the generator. The cable is compatible with the Valleylab generator models Force FX™, ForceEZ™, and ForceTriad™.

1. Turn power off and unplug the smoke evacuator and generator from the power source.
2. Remove the metal cover plate in the center of the generator back panel to access optional ports.
3. Plug the interlink cable into the generator RF Activation port.
4. Plug the interlink cable into the Remote Activator jack on the back panel of the smoke evacuator.

5. Plug the generator and smoke evacuator into outlets of proper voltage.
6. Turn power on to both devices.
7. When the generator and smoke evacuator have completed their self tests, set the level of suction to be used when the smoke evacuator is activated.
8. Press the up-arrow (  ) button until reaching the desired pre-setting.
9. Press the RapidVac+ button.

The pre-set suction level is now selected. The smoke evacuator continues to run and suction reduces to a minimal level. Use of the surgical pencil will automatically activate the RapidVac to the pre-set suction level. When the pencil is deactivated, the smoke evacuator will return to minimal suction.

## Maintenance

### Motor Brush Replacement

The motor brushes are the only part of the RapidVac Smoke Evacuator requiring regular service. After 500 hours of use, the Service Indicator LED on the front panel illuminates, indicating the brushes require replacement.

#### Caution

Turn off the smoke evacuator and unplug the power cord from the wall power outlet and the smoke evacuator before performing any service to the unit.

1. Turn over the smoke evacuator and lay it on its top panel.
2. Use a Phillips head screwdriver to remove the screws from the bottom plate securing the metal cover.
3. Remove the two screws from the bottom edge of the back panel securing the cover.
4. Lift the bottom plate from the cover and set it aside.
5. Within the cover, locate three colored wires leading from the foam fan-motor assembly and through an opening in the cover. Pull the leads apart at their connectors.
6. Lift the fan-motor assembly out of the cover.

#### Important

Note the orientation of the foam housing including the location of the wire leads and the air-intake opening in the foam. The assembly must be replaced in the same orientation when reassembled.

7. Remove the foam sections from the front and rear of the fan-motor assembly.

8. Using a Phillips head screwdriver, remove the screw securing each of the two brushes to the motor.



9. Gently lift the rear of the brush assembly to extract the metal spade on the bottom of the assembly from its receptacle.



10. Remove the brush from the motor.
11. Insert a new brush into the motor and align the metal spade over the receptacle.



12. Lower the rear of the brush assembly to insert the metal spade into the receptacle.
13. Secure the brush assembly with a screw.
14. Remove and replace the second brush using the same procedures.
15. After both brushes have been replaced, reassemble the foam housing around the motor.

**Important**

The plate around the fan-motor assembly has upraised tabs that are keyed to fit each foam section in the proper orientation. Match the slots in foam edges with the tabs.

16. Replace the foam housing and motor in the cover, positioned in the original orientation as it was removed.
17. Match each of the three wire leads from the motor with the wire of the same color. Attach and firmly seat each connector.
18. Replace the bottom plate on the cover and secure with the screws previously removed.
19. Turn over the smoke evacuator, placing it upright on the rubber feet.
20. Plug the power cable into the smoke evacuator receptacle and a power outlet.
21. Simultaneously press and hold the up-arrow () and down-arrow () buttons until the Maintenance Required LED turns off.
22. Verify the smoke evacuator is working properly by progressing through the suction settings using the up-arrow (  ) air flow control, then regress using the down-arrow (  ) control.



# Troubleshooting

This section describes solutions to problems that may occur when operating the smoke evacuator.

If the smoke evacuator is not functioning properly, use the information in this section to assist in identifying and correcting the malfunction.

## Inspecting the RapidVac Smoke Evacuator

If there is a problem with the operation of the smoke evacuator, inspect the unit for obvious conditions that can cause a malfunction:

- Check for visible signs of damage
- Verify the connections of all cables and tubing
- Verify proper filter installation
- Verify that the power switch is on and the power-on indicator LED in the center of the fan symbol is blinking.
- Check the filter life indicators to ensure the filter has available filter time remaining.

## Correcting Specific Malfunctions

If a solution to the problem is not readily apparent, use the following table to identify and correct specific malfunctions. After correcting the malfunction, verify that the smoke evacuator is working properly.

| Situation                                                                                | Possible Cause                                                                                                    | Recommended Action                                                                                                      |
|------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| Smoke evacuator is on but there is minimal or no vacuum or airflow at the wand or tubing | Improperly installed ULPA filter                                                                                  | Ensure the ULPA filter is properly installed. Reposition if necessary.                                                  |
|                                                                                          | Clogged tubing                                                                                                    | Unclog/replace the tubing.                                                                                              |
|                                                                                          | Clogged ULPA filter                                                                                               | Replace the filter.                                                                                                     |
|                                                                                          | Obstructed or malfunctioning motor and/or blower                                                                  | Contact Valleylab service for assistance.                                                                               |
| Smoke evacuator does not adsorb odors                                                    | Charcoal component of the filter has expired                                                                      | Replace the filter.                                                                                                     |
| Smoke evacuator does not operate                                                         | Disconnected or faulty power cord                                                                                 | Check and correct the power cord connections. Check the cord for damage. Replace cord if needed.                        |
|                                                                                          | No power from wall receptacle (power cord is connected to wall receptacle, but Mode Indicator is not illuminated) | Check the power at the wall receptacle. Connect power cord to a functional wall receptacle.                             |
|                                                                                          | Power switch on the front panel is off (O)                                                                        | Turn the power switch on (I).                                                                                           |
|                                                                                          | Fuses damaged                                                                                                     | Check the fuses to see if they have burned through from being overloaded or otherwise damaged. Replace fuses if needed. |

| Situation                                                                     | Possible Cause                                        | Recommended Action                                                                                                                                                                                                                                                               |
|-------------------------------------------------------------------------------|-------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Footswitch does not activate smoke evacuator when Footswitch mode is selected | Improperly connected footswitch                       | Check that the footswitch is securely connected at the front of the smoke evacuator.                                                                                                                                                                                             |
|                                                                               | Malfunctioning footswitch                             | Replace the footswitch.                                                                                                                                                                                                                                                          |
|                                                                               | Incorrect footswitch connected to the smoke evacuator | Connect the RapidVac Footswitch (SEA3745) to the smoke evacuator.                                                                                                                                                                                                                |
|                                                                               | Filter incorrectly installed                          | Reinstall the filter. Ensure that the filter is fully seated in the smoke evacuator and the securing tab locks into place.                                                                                                                                                       |
|                                                                               | Malfunction in the smoke evacuator                    | Contact Valleylab service.                                                                                                                                                                                                                                                       |
| Indicator LEDs do not illuminate                                              | No electrical power                                   | Refer to electrical utility maintenance.                                                                                                                                                                                                                                         |
|                                                                               | Fuses damaged                                         | Check the fuses to see if they have burned through from being over loaded or otherwise damaged. Replace fuses if needed.                                                                                                                                                         |
|                                                                               | Malfunction in the smoke evacuator                    | Contact Valleylab service.                                                                                                                                                                                                                                                       |
| Motor does not run, but Power On LED illuminates                              | Filter incorrectly installed                          | Reinstall the filter. Ensure the filter is fully seated in the smoke evacuator and the securing tab locks into place.                                                                                                                                                            |
|                                                                               | Malfunction in smoke evacuator                        | Contact Valleylab service.                                                                                                                                                                                                                                                       |
| ESU remote does not activate when RapidVac mode is selected                   | Generator interlink cable incorrectly installed       | Ensure the generator interlink is properly connected to the rear panel of the smoke evacuator and the Valleylab generator.                                                                                                                                                       |
|                                                                               | Remote Switch Activator incorrectly installed         | Ensure the Remote Switch Activator is connected to the rear of the smoke evacuator.<br><br>or<br>Check the Remote Switch Activator to ensure it is attached to the ESU in a location where it can detect the audible tone. If needed, move closer to the speaker emitting tones. |
|                                                                               | ULPA filter incorrectly installed                     | Reinstall the filter. Ensure the filter is fully seated in the smoke evacuator and the securing tab locks into place.                                                                                                                                                            |



# Return Policy and Procedure

Refer to this section for information about:

- The manufacturer's responsibility
- Returning the smoke evacuator for service
- Service centers

## Responsibility of the Manufacturer

Valleylab is responsible for the safety, reliability, and performance of the smoke evacuator only under the following circumstances:

- Installation and setup procedures in this manual are followed.
- Readjustments, modifications, or repairs to the unit are carried out by persons authorized by Valleylab.
- The electrical installation of the relevant room complies with local codes and regulatory requirements, such as UL.
- The accessories are used in accordance with the Valleylab instructions for use.

For warranty information, refer to the Warranty at the beginning of this guide.

## Obtaining a Return Authorization Number

### Notice

For repairs, return the smoke evacuator to Valleylab.

Before you return the smoke evacuator, call the Valleylab Customer Service Department (1-800-255-8522) for a Return Authorization Number or call your Valleylab Representative for assistance.

Have the following information ready when you call:

- Hospital/clinic name/customer number
- Telephone number
- Department/address, city, state, and zip code
- Model number
- Serial number
- Description of the problem

## Returning the Smoke Evacuator for Service

Follow this procedure when returning the smoke evacuator for service. Service center information is provided below.

1. Remove the filter and any attached tubing and fluid container.

### Warning

The ULPA filter captures potentially hazardous particles. Handle used filters as you would any biohazardous material. Dispose of filters with other operative waste materials according to the procedures for your institution.

2. Clean the smoke evacuator thoroughly. Follow the procedures approved by your institution or use a validated infection control procedure.
3. Attach a tag to the smoke evacuator that includes the Return Authorization Number and the information listed above (i.e., hospital, phone number, etc.).

4. Be sure the smoke evacuator is completely dry. Then, package the smoke evacuator in its original shipping container, if available.
5. When you receive the Return Authorization Number, ship the smoke evacuator prepaid according to Valleylab's instructions.

## Service Centers

For a complete list of service centers worldwide, please refer to the Valleylab website:

<http://www.valleylab.com/valleylab/international/service-world.html>



# RapidVac Schematic

This section contains a schematic drawing for the RapidVac Smoke Evacuator.

